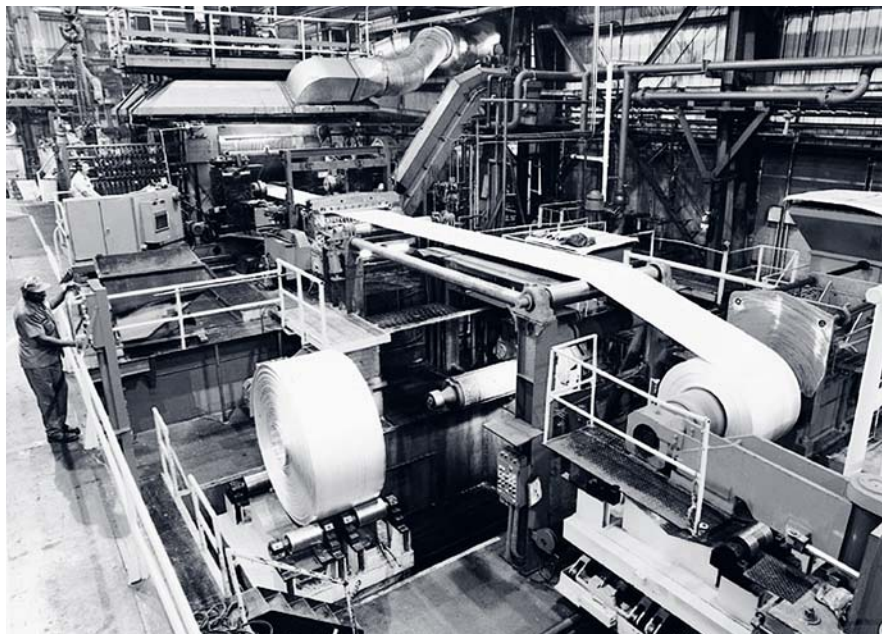


# Chlorine flux gas monitoring



## Steel Case Study 106-1

### Application

Aluminum plants are currently required to comply with the EPA's National Emission Standards for Hazardous Air Pollution for Secondary Aluminum Production. Under 40CFR Part 63, these facilities must meet emission standards reflecting the application of the maximum achievable control technology (MACT). One of the pollutants that require MACT monitoring and reporting is chlorine.

Chlorine is used as a fluxing gas. Fluxing in this application is the process of refining the molten aluminum to improve product quality, achieve product specification, or reduce material loss. Injection of chlorine is used to remove magnesium (demagging) or hydrogen bubbles (degassing). A  $\pm 1\%$  of reading accuracy for chlorine flux injection rate is required under the regulations.

### Challenge

A major challenge in the monitoring of chlorine fluxing gas is the necessity to measure at very

low flow rates and large turndowns with the required  $\pm 1\%$  of reading accuracy. A typical application range is 0.5 to 30 SCFH [45 to 2700 grams/hr].

Temperatures and pressures may vary and because gases are so compressible, measuring volumetric flow could lead to severe errors. Only direct mass flow measurement could assure consistent accuracy. In addition to the accuracy over a wide flow range, chlorine gas can be highly corrosive over time, particularly when exposed to water. Thus all wetted materials of construction in the flow meter must be compatible with chlorine.

Since chlorine gas is also very toxic, calibration of a flow meter using the actual gas is undesirable. Ideally, calibration of a chlorine flow meter should be performed with a media that is simpler and safer to handle and is directly transferable to chlorine.

### Project parameters

User	Aluminum plant
Location	Indiana, USA
Media	Chlorine
Flow Range	0.5 to 30 SCFH [45 to 2700 grams/hr]
Pressure Range	25 to 40 psig [1.7 to 2.8 bar(g)]
Temperature Range	-60°F to +120°F [-15°C to +49°C]

### Solution

FCI was able to meet these challenges with the FlexCOR® Coriolis mass flowmeter. In this flow range, the Model CMF-A with a 1.5 mm I.D. tube, performed well within the required  $\pm 1\%$  of reading requirement. Because the FlexCOR is a true mass flow meter, calibration in any media is directly transferable to chlorine gas. The maximum pressure drop at the highest flow is approximately 13 psia.

The FlexCOR provides a solution that covers the entire range of parameters for this application. Required accuracy is sustained regardless of temperature and pressure fluctuations in the process. Other gases, such as argon, used in the fluxing process are also being measured using the same model FlexCOR as are larger capacity models for higher flow rate requirements.

### FCI flow meter specifications

Model	CMF-A FlexCOR®
Wetted Material	Hastelloy C-22
Media	All single phase fluids
Flow Range	0 to 2.4 lbs/min [0 to 65 kgs/hour]
Pressure Range	to 6670 psig [460 bar(g)]
Temperature Range	-58°F to +356°F [-50°C to +180°C]

### Your local FCI representative:



Web: [www.fluidcomponents.com](http://www.fluidcomponents.com) | Email: [info@fluidcomponents.com](mailto:info@fluidcomponents.com)

1755 La Costa Meadows Drive, San Marcos, California 92069 USA | Phone: 760-744-6950 | Toll free: 800-854-1993 | Fax: 760-736-6250

European Office: Persephonestraat 3-01 5047 TT Tilburg, The Netherlands | Phone: 31-13-5159989 | Fax: 31-13-5799036

FCI is ISO 9001 certified/conformance to AS9000